

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A system for measuring dimensions of a body cavity, comprising:
 - a source of coherent light;
 - a patient leg that is insertable into a patient's body cavity including one or more optical fibers that direct light from the light source against a wall of the body cavity and receive light reflected from the cavity wall;
 - a reference leg including one or more optical fibers and a reflecting surface at an end thereof that receives light from the light source and reflects the light at the end of the reference leg;
 - a beam splitter that divides light from the light source into the patient leg and the reference leg and combines light reflected from the reference leg and the patient leg;
 - at least two detectors spaced in quadrature for detecting fringes in the combined light; and
 - a processor for counting the fringes detected by the detector, wherein the number of fringes is proportional to the distance between an end of the one or more optical fibers in the patient leg and the wall of the body cavity.
2. The system of Claim 1, further comprising a mechanism for rotating the light emitted by the one or more optical fibers in the patient leg within the body cavity.
3. The system of Claim 2, wherein the mechanism for rotating the light includes a rotatable optical coupler that couples light into the one or more optical fibers of the patient leg and a motor that rotates the one or more optical fibers in the patient leg.
4. The system of Claim 3, wherein the one or more optical fibers in the patient leg are routed in a catheter and the mechanism for rotating the light rotates the catheter.
5. The system of Claim 2, wherein the mechanism for rotating the light within the body cavity includes a movable light deflector at or adjacent the distal end of the patient leg that directs the light emitted within the body cavity.

6. The system of Claim 1, wherein the one or more optical fibers of the patient leg are routed within a catheter that includes indications of length thereon, the system further including a computer that receives information regarding a depth of insertion of the catheter to construct a model of the body cavity.

7. The system of Claim 6, where the indications of length on the catheter are visually perceptible.

8. The system of Claim 6, wherein the indications of length on the catheter are machine-readable.

9. A system for measuring an internal body cavity of a patient, comprising:
an interferometer that directs a beam of coherent light into a reference leg and a patient leg that is insertable into the body cavity, the patient leg including a length marking that indicates the depth of insertion of the patient leg into the body cavity;
a mechanism for rotating the beam of light within the body cavity and receiving light that is reflected from a wall of the body cavity;
a detector that detects a difference in an optical path length between light directed into the reference leg and the patient leg; and
a computer system that receives signals from the detector and an indication of the depth of insertion of the patient leg to construct a three-dimensional model of the body cavity.

10. The system of Claim 9, wherein the length marking on the patient leg is readable by a sensor connected to the computer.

11. The system of Claim 9, wherein the detector includes at least a first and second sensor positioned in quadrature.